# SNOW BLOWER WITH GLIDE WHEELS

## 1. Field of the Invention:

The present invention relates to devices for snow blowers, and more particularly, to a glide wheel assembly for maintaining proper blade-ground clearance during operation of self-propelled snow blowers. The glide wheel assembly may be configured for use on snow blowers for stand-behind operation that have an engine situated above two drive wheels and an attached front-mounted auger housing.

## 2. Background of the Related Art

Self-propelled snow blowers may be configured for stand-behind operation and have an engine situated above two drive wheels and an attached front-mounted auger housing. To ensure effective operation and snow removal, the operator must maintain a proper clearance between the auger housing horizontal bottom leading edge (conventionally called a scraper blade) and the surface from which snow is being removed. The proper adjustment of this clearance is critical because if the scraper blade clearance above the surface is excessive, the snow is not cleanly removed. If the clearance above the surface is insufficient, the scraper blade may dig into the surface, making operation of the snow blower difficult. In addition, the front of the auger requires physical support during operation to carry some of the weight of the device.

Wear shoes or skid shoes have been developed for snow blowers or similar devices that maintain the proper clearance between the scraper blade and the ground surface. For example, U.S. Patent No. 2,768,453 to Adams describes a wear shoe

mechanically affixed by bolts to a snow scoop assembly. To compensate for different plowing conditions or to account for plate wear, the height of the snow scoop above the surface to be plowed is adjusted by an operator by loosening the bolts and increasing or decreasing the amount of the wear shoe projecting below the bottom of the snow scoop. The bolts are then tightened, mechanically fixing the wear shoes to the snow scoop assembly.

U.S. Patent No. 5,438,770 to Miller describes a track-driven snow blower with pivot wheels that can be lowered to assist in turning corners. The pivot wheels do not set the height of the auger housing during snow removal. Miller shows skid shoes on the auger housing to support the front of the auger housing during snow removal and to set the distance between the lower leading edge of the auger housing and the surface to be cleared of snow.

U.S. Patent No. 4,441,266 to Westimayer describes a skid shoe detachably mounted to the side of the snow blower auger housing such that the skid shoe mounting assembly can be easily reassembled to a plurality of preset heights. Normal wear of the skid shoes requires that they be adjusted frequently to prevent digging of the lower leading edge of the auger assembly into the plowed surface. Replacement of the skid shoes is required when the skid surface is worn away. Another characteristic of skid shoes is that they skid over only minor irregularities in the surface. When skid shoes encounter larger obstacles during plowing, such as cracks or ridges of ice, forward movement can be abruptly halted, making operation awkward and physically strenuous to the operator.

In light of the foregoing, a need exists for an assembly that supports a snow blower auger assembly, that provides selective control over the height of the auger leading edge above the surface to be cleared of snow, and that does not experience the excessive wear of skid shoes and the resulting required frequent adjustments to them. Similarly, it would be advantageous to provide a means of support for the auger housing that could climb over larger obstacles rather than colliding into them and stopping forward motion of the snow blower.

## SUMMARY OF THE INVENTION

The present invention is directed to providing a glide wheel means to support the snow blower auger housing and to provide for clearance between the scraper blade and the surface to be cleared of snow. The use of glide wheels rather than skid shoes reduces the friction between the auger housing and the ground. The wear of the wheels is negligible as compared to the wear experienced by skid shoes. The height difference between the scraper blade and the bottom of the wheel remains constant, preventing the scraper blade from digging into the surface to be cleaned. The wheels are located so that the height of the scraper blade above the bottom of the wheels is between about 0.0 cm and 2.0 cm. Glide wheels have the further advantage over skid shoes in that they roll over obstacles that skid shoes would collide with or dig into.

As the engine of the snow blower accounts for most of the weight of the snow blower, and the drive wheels are typically situated directly beneath the engine, the drive wheels typically carry most of the weight of the snow blower. Accordingly, the glide wheels carry only a small portion of the weight of the snow blower, normally on the order of 250 newtons (mass of 25.5 kg) or less. The glide wheels may therefore be of

moderate construction, and may be made of any appropriate material known to those skilled in the art. The glide wheels should be fairly narrow so as to displace as little snow as possible during snow blowing operations. In a preferred embodiment, the wheel width is about 2.5 cm. The wheels may be of steel or aluminum and have rubber or plastic running surfaces, or the wheels may be all-synthetic , providing the advantage of avoiding rust or corrosion, a feature that is of particular importance in the area of the bearings. The running surfaces are preferably abrasion resistant and relatively hard. In a preferred embodiment of the present invention, Polyolefin-cored wheels having polyurethane running surfaces without tread and Delrin® bearings are used.

The glide wheels are mounted generally parallel to each sidewall of the auger housing. In this embodiment, the glide wheels rotate during snow blowing operations along a substantially linear path. When sharp turns are encountered, such as corners, the glide wheels easily slide sideways to accommodate the turn. If desired, the glide wheels may articulate in the manner of a caster.

It is a further object of the present invention to provide a glide wheel mounting assembly means that is easily adjustable for the accommodation of a range of clearances between the scraper blade and the surface to be cleared of snow. In this embodiment, the glide wheel mounting assembly is comprised of a bracket plate to which a cylindrical axle for a wheel is perpendicularly affixed at a location in the central portion of the bracket plate. The area of the bracket plate where the axle is affixed may be raised by stamping, pressing or forging to provide a concave space, with room for a protrusion of the axle and means to bind the axle to the bracket plate, such as by welding. Viewed from the side, the bracket plate extends in width beyond the wheel, both to the left of the

wheel and to the right of the wheel. In the portion of the bracket plate that extends past one side of the wheel, there is a hole to accept a bolt or other suitable fastener from the sidewall of the auger housing. In the portion of the bracket plate that extends past the other side of the wheel there is a slot to accept a bolt or other suitable fastener from the sidewall of the auger housing. The wheel is held onto the axle by a suitable fastening means such as a cotter pin, a stop nut, a cap nut, or other means that are known to those skilled in the art..

In yet another embodiment, there is one glide wheel mounting assembly for each of the two sidewalls of the auger housing. The assemblies are bolted into place on each sidewall of the auger housing. On each assembly, the side of the bracket plate having the hole acts as a pivot against which the bracket plate may be rotated. Such a configuration has the added advantage of vertical adjustment for the axle and wheel.

In yet another embodiment, the bracket plate could be slotted at both sides to accept bolts or other suitable fasteners, providing the additional benefit of increasing the range of the adjustment possibilities without extending the length of the slot.

These and other unique features of the glide wheel assembly and method disclosed herein will become more readily apparent from the following detailed description of preferred embodiments, the accompanying drawings and the appended claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

So that those having ordinary skill in the art to which the disclosed glide wheels and method appertain will more readily understand how to make and use the same, reference may be had to the drawings wherein:

*Fig. 1A* is a snow blower, in particular configured for stand-behind operation having an engine situated above two drive wheels and an attached front-mounted auger housing with glide wheels.

*Fig. 1B* is a cross-sectional view of an axle for a glide wheel attached to a sidewall of a snow blower auger housing.

*Fig. 2A* is a side view of a glide wheel mounting assembly.

*Fig. 2B* is an end view of a glide wheel mounting assembly.

*Fig. 2C* is a cross-sectional view of a bracket plate having a raised portion forming a concave cavity with the axle affixed to the bracket plate.

*Fig. 3* is the side view of a glide wheel mounting assembly attached to a sidewall of a snow blower auger housing.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The subject disclosure relates to glide wheels to support the auger housing of a snow blower and to provide for clearance between the scraper blade and the surface to be cleared of snow. The glide wheels may be attached directly to the side walls of the auger housing, or, alternatively, the glide wheels may be part of a glide wheel assembly and means for adjustably supporting a front assembly of power driven equipment. The device and method are particularly applicable for use in snow removing equipment configured for stand-behind operation having an engine situated above two drive wheels and an

attached front-mounted auger, although they may be utilized in many other applications to replace skid shoes as a means of support for other types of power equipment, as would be readily appreciated by those skilled in the pertinent art. The advantages and other features of the device and method disclosed herein will become more readily apparent to those skilled in the pertinent art from the following detailed description of preferred embodiments of the invention taken in conjunction with the drawings which set forth representative embodiments of the present disclosure and wherein like reference numeral identify similar structures.

Referring to Fig. 1A, in one embodiment of the invention, a snow blower 10 is generally indicated with engine 11 located above drive wheels 12. Attached to the front of the snow blower 10 is an auger housing 13 with sidewalls 14, auger blades 15, and scraper blade 16. Glide wheels 17 are attached to sidewalls 14.

Referring to Fig. 1B, the glide wheels 17 may be attached to the sidewalls 14 using an axle 60 having a a shoulder 61 and a threaded end 62 which passes through a center hole in the glide wheel 17 and an appropriately sized hole in the sidewall 14. The hole in sidewall 14 could be a slotted hole, oriented vertically, to provide vertical adjustment of the wheel location. Alternatively, there could be a multiplicity of holes in the sidewall 14 to provide vertical adjustment for the wheel location.

The threaded end 62 of the axle extends through the sidewall 14 far enough to permit a flat washer 65, a lock washer 63 and a nut 64 to be attached, thereby securing the axle to the sidewall. The glide wheel 17 rotates on the axle 60 and is secured to the axle by any appropriate fastening means, such as a cotter pin, a stop nut, a cap nut, or any other means known to those skilled in the art. Washers may be provided on each side of

the glide wheel to allow easy rotation of the glide wheel. The invention is not limited to this means of attaching the glide wheels to the sidewalls, and any appropriate means of attaching the glide wheels to the sidewalls known to those skilled in the art may be used.

Referring to Figs. 2A and 2B, a glide wheel mounting assembly 20 is comprised of bracket plate 21 with perpendicularly attached axle 22 for glide wheel 17. Flat washers 25 separate the glide wheel 17 from bracket plate 21 and stop nut 26. Pivot hole 23 is located outboard of glide wheel 17 on one end of bracket plate 21. Slotted hole 24 is located outboard of glide wheel 17 on the opposite end of bracket plate 21 from the pivot hole 23. The axle may be fixed directly to the bracket plate by any means known to those skilled in the art. In a preferred embodiment, the axle is fixed to the bracket by welding.

Referring now to Fig. 2C, an embodiment of the bracket plate is shown wherein the bracket plate 21 is forged, hammered or stamped to form a concave section 50 in the area of the bracket where the axle 22 meets the bracket plate. The concave section 50 forms a cavity 51 on the inner face of the bracket plate. The axle 22 passes through a hole in the bracket plate and is fixed to the bracket plate by a weld 52.

Referring now to FIG. 3, a glide wheel mounting assembly 20 is shown attached to auger sidewall 14. Pivot bolt 27 from sidewall 14 goes through pivot hole 23, flat washer 28, lock washer 29, and nut 30. Bolt 31 from sidewall 14 goes through slotted hole 24, flat washer 32, lock washer 33, and nut 34. Adjustment of the height of the scraper blade 16 above the surface 40 is achieved by loosening nuts 30 and 34 and rotating the glide wheel assembly 20 around the pivot bolt 23 until the desired height is reached and then re-tightening nuts 30 and 34. However, as may be recognized by those

skilled in the pertinent art based on the teachings herein, the means to fixably adjust the height of the glide wheel assembly relative to the scraper blade may take any of numerous different configurations that are currently or later become known. In addition, the glide wheel assembly may include a plurality of wheels on each side of the auger housing.

While the subject invention has been described with respect to certain preferred embodiments, it will be appreciated by those skilled in the art that the principles and inventive concepts could be applied in any of numerous different applications. Further, those skilled in the art will readily appreciate that various changes and/or modifications can be made to the above-described and other embodiments of the present invention without departing from the spirit or scope of the invention as defined in the appended claims. For example, the components of the glide wheel assembly can be made of any of numerous different materials, or may take any of numerous different shapes and/or configurations that are currently or later become known. For example, the glide wheel may be configured as a caster. In addition, the mechanism for connecting the glide wheel assembly may take any of numerous different configurations. For example, a rotatable tube, conduit or other connecting device may be connected to the auger assembly and glide wheel axle to facilitate lateral auger housing motion. Accordingly, this detailed description of preferred embodiments is to be taken in an illustrative as opposed to a limiting sense.